Application for 2003 Urban Water Conservation Grant Funding

Industrial Process Capital Improvement Proposal

Metropolitan Water District of Southern California

MWD
METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

A-1 Urban Water Conservation Grant Application Cover Sheet

1. Applicant (Organization or affiliation): Metropolitan Water District of Southern California
2. Project Title: Industrial Process Capital Improvement

3. Person authorized to sign and submit proposal:

Name, Title	Stephen N. Arakawa Manager, Water Resource Management Group
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E-mail	sarakawa@mwdh2o.com

4. Contact person (if different):

Name, Title	Jon G. Sweeten, P.E. - Engineer
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5. Funds requested (dollar amount): $348,630

6. Applicant funds pledged (local cost share) (dollar amount): $247,170

7. Total project costs (dollar amount): $662,000

8. Estimated net water savings (acre-feet/year): 107 AFY
   Estimated total amount of water to be saved (acre-feet): 1,605 AF
   Over 15 years

   Benefit/cost ratio of project for applicant: 1.1
   Estimated $/acre-feet of water to be saved: $441/AF

9. Project life (month/year to month/year): 1/2004 – 12/2020
10. State Assembly District where the project is to be conducted: 56,60,67-73
11. State Senate District where the project is to be conducted: 29,33-35,38
12. Congressional District(s) where the project is to be conducted: 40,42,44,46-48
13. County where the project is to be conducted: Orange
14. Do the actions in this application involve physical changes in land use, or potential future changes in land use? No

A-2 Application Signature Page

By signing below, the official declares the following:

The truthfulness of all representations in the application;

The individual signing the form is authorized to submit the application on behalf of the applicant;

The individual signing the form read and understood the conflict of interest and confidentiality section and waives any and all rights to privacy and confidentiality of the application on behalf of the applicant; and

The applicant will comply with all terms and conditions identified in this Application Package if selected for funding.

ORIGINAL SIGNED BY:
STEPHEN N. ARAKAWA, MANAGER
MWD WATER RESOURCE MANAGEMENT GROUP
DATED NOV 26, 2002

_____	_____	_____
Signature	Name and title	Date

A-3 Application Checklist

Part A: Project Description, Organizational, Financial and Legal Information

___√___A-1 Urban Water Conservation Grant Application Cover Sheet
___√___A-2 Application Signature Page
___√___A-3 Application Checklist
___√___A-4 Description of project
__N/A__A-5 Maps
___√___A-6 Statement of work, schedule
___√___A-7 Monitoring and evaluation
___√___A-8 Qualification of applicant and cooperators
___√___A-9 Innovation
___√___A-10 Agency authority
___√___A-11 Operation and maintenance (O&M)

Part B: Engineering and Hydrologic Feasibility (construction projects only)

__N/A__B-1 Certification statement
__N/A__B-2 Project reports and previous studies
__N/A__B-3 Preliminary project plans and specifications
__N/A__B-4 Construction inspection plan

Part C: Plan for Environmental Documentation and Permitting

___√___C-1 CEQA/NEPA
___√___C-2 Permits, easements, licenses, acquisitions, and certifications
___√___C-3 Local land use plans
___√___C-4 Applicable legal requirements

Part D: Need for Project and Community Involvement

___√___D-1 Need for project
___√___D-2 Outreach, community involvement, support, opposition

Part E: Water Use Efficiency Improvements and Other Benefits

___√___E-1 Water use efficiency improvements
___√___E-2 Other project benefits

Part F: Economic Justification, Benefits to Costs Analysis

___√___F-1 Net water savings
___√___F-2 Project budget and budget justification
___√___F-3 Economic efficiency

Appendix: Benefit/Cost Analysis Tables

___√___Tables 1; 2; 3; 4a, 4b, 4c, 4d; and 5

Resume of Applicant

____√____

A-4 Description of Project

A metal finishing contractor producing parts for the automobile and appliance industry is interested in reducing its operating costs. The facility is experiencing increasing water and sewer costs and expects these charges to continue to rise in the future.

The facility currently uses 120,000 gallons per day (gpd) while operating 24 hours per day, 6 days per week. Annual water use is approximately 112 acre-feet per year (AFY).

There are five separate process lines in the facility. Each one is designed to provide either zinc plating or anodizing of a bare metal part. The parts are moved through the various dip and quench tanks either by hand or with the use of a crane, depending on the size of the part. Hand dip tank volumes run between 100 and 1,000 gallons. Crane dip tanks can be up to 5,000 gallons in volume.

A sample zinc plating process might contain the following baths:

1. Soak in Cleaner
2. Electro-clean
3. Rinse
4. Rinse
5. Nitric Acid dip
6. Hot Water
7. Rinse
8. Rinse
9. Black Chromate
10. Black Chromate Rinse
11. Yellow Chromate
12. Rinse
13. Hydrochloric Acid dip
14. Hydrochloric Acid Stripping
15. Rinse
16. Rinse
17. Rinse
18. Acetic Acid dip
19. Rinse
20. Chloride Zinc Plating
21. Rinse
22. Alkaline Zinc Plating

Discharge from these tanks is captured and treated on-site by conventional treatment processes before being discharged to the sewer. Conventional treatment involves precipitation, chemical addition to capture the heavy metals by flocculation (caustic soda, polymers and sodium metabisulfate), followed by gravity thickening, and filter presses. The wastewater is pH adjusted and is then

suitable for discharge into the sanitary sewer but not of sufficiently high quality for reuse within the plant.

A capital improvement project has been proposed to the facility to replace the existing wastewater treatment process train with a new system that would apply advanced reverse osmosis, electrocoagulation and electrodialysis to the same wastewater stream, rendering it suitable for re-use in almost every process within the facility. Approximately 95 percent of the water previously discharged to the sewer can be renovated and returned to service in the facility. This can result in a reduction of over 100 AFY in potable water demand on the public water system. The facility would trade the cost of operating the existing conventional treatment system for the reduced cost of operating the advanced treatment process train. The savings to the facility would result from a reduction of current potable water use expense and diminished sewage discharge fees.

Annual benefits are calculated as follows:

1. Savings from reduced water purchases	$24,000
2. Savings from reduced sewer fees	$46,000
3. Savings from the reduced volume of material for disposal	$12,000
4. Wastewater treatment savings – Labor	$10,000
5. Wastewater treatment savings – Chemicals	$36,000
Total estimated annual savings	$128,000

The cost to design, purchase and install the advanced treatment process train is estimated at $662,000. This includes $550,000 for the equipment and $112,000 for engineering, installation, freight, taxes, etc.

The simple payback period for this project from the facility's perspective is 5.2 years ($662,000/$128,000).

A-5 Maps

The facility is located in Orange County, CA.

A-6 Statement of Work, Schedule

Task	Quarter #1 CY2004			Quarter #2 CY2004			Quarter#3 CY2004			Quarter #4 CY2004		
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Sign Contract	**X**											
Order Equip.		**X**										
Complete Drawings				**X**								
Equip Delivered					**X**							
Begin Repiping				**X**								
Complete Repiping										**X**		
Bring On-line											**X**	
Quarterly Expenditures	$37,000 Eng			$40,000 Eng $550,000 Equip			$30,000 Eng			$5,000 Eng		

The above schedule shows the likely timeline of the project's implementation, assuming that it is started in January 2004. Existing engineering and process design firms are available and familiar with the technology being applied. The equipment is also readily available from local manufacturers.

A-7 Monitoring and Evaluation

The measurement of water savings is straightforward. A totalizing meter will be placed on the return line from the advanced treatment process train. Water that would otherwise have been discharged to the sewer will be rerouted back to the dip and quench tanks. This reuse of water represents a reduction in demand on the local, as well as regional, water supply. The local water retailer will collect the meter readings from its customer and will occasionally confirm the meter's integrity and correlate the meter's total with the reports from the customer. Sewage discharge monitoring will also confirm the reduction of discharge into the sanitary sewer system.

Metropolitan Water District will be invoiced by the water retailer for the documented water savings amount on a quarterly, or other suitable interval. Metropolitan will, in turn, place a credit on that agency's water bill from Metropolitan.

The savings information will reside with the facility, the retail water agency and Metropolitan Water District. A final project report will be prepared, along with professional papers, presentations at the association meetings of the various process organizations, and general dissemination of the project results through

the press, local water newsletters and websites, etc. to promote such technology in other applications.

A-8 Qualifications of the Applicant and Cooperators

Resume of Jon Sweeten is attached at back of application.

There will be one or two external cooperators on the project. Preferably, the engineering firm that designs the system will also handle equipment manufacture and purchase but these two tasks may be handled separately. Oversight by Jon Sweeten and the facility engineer will be on-going.

A-9 Innovation

Industrial process water use represents six percent of the water demand in Metropolitan's service area. Studies from the 1990s indicated a potential savings of 25 percent of the total water use in these facilities could economically be saved. In this case, economically was defined as having a simple payback period of short enough duration that an industry would be willing to invest in the new capital improvement. The suitable length of payback for many facilities was two years. The extent of savings in this proposal was not presented for consideration to most of the facilities.

This treatment process is directly applicable to some of the major water users in the industrial sector. These include metals, electronics, pharmaceuticals, and semiconductor manufacturing. Facilities of these types are prevalent throughout California.

Additionally, this may result in a reduction of heavy metals and other toxics being received at publicly operated treatment works.

A-10 Agency Authority

1. **Does the applicant (official signing A-2, Application Signature Page) have the legal authority to submit an application and to enter into a funding contract with the State? Provide documentation such as an agency board resolution or other evidence of authority.**

   Yes. MWD's Administrative Code (§ 8115), as last amended by MWD's Board of Director's by Minute Order 44582 (August 20, 2001), provides that "[i]f the amount payable or expected to be paid by the [Metropolitan Water] District under the terms of a contract is less than $250,000, the contract my be executed by the Chief Executive Officer unless otherwise directed by the Board." (MWD Admin. Code § 8115 (c).) Because Metropolitan will not be required to make payments of $250,000 or more under the terms of a funding

contract with the State, Metropolitan's Chief Executive Officer or his delegate are authorized to submit this application and to enter into the funding contract.

2. **What is the legal authority under which the applicant was formed and is authorized to operate?**

   Metropolitan is a quasi-municipal corporation created in 1929 pursuant to the Metropolitan Water District Act. (Stats. 1927, ch. 429; City of Pasadena v. Chamberlain (1928) 204 Cal. 653, 663); Metro. Water Dist. v. County of Riverside (1943) 21 Cal.2d 640, 642.) Operating under the authority of the Metropolitan Water District Act (Stats. 1969, ch. 209, as amended; Water Code App. §109), Metropolitan's primary responsibility is to acquire and develop water for delivery for municipal and domestic uses within Metropolitan's service area. (See Water Code App. § 109-25.)

3. **Is the applicant required to hold an election before entering into a funding contract with the State?**

   No. See the Response to 1, above. No action by Metropolitan's Board of Directors is required for Metropolitan's Chief Executive Office or his delegate to enter into a funding contract with the State.

4. **Will the funding agreement between the applicant and the State be subject to review and/or approval by other government agencies? If yes, identify all such agencies (e.g. Local Area Formation Commission, local governments, U.S. Forest Service, California Coastal Commission, California Department of Health Services, etc.).**

   No.

5. **Is there any pending litigation that may impact the financial condition of the applicant, the operation of the water facilities, or its ability to complete the proposed project? If none is pending, so state.**

   No. While Metropolitan is a party to various legal proceedings, Metropolitan does not believe an adverse ruling in any pending litigation would substantially impact Metropolitan's financial conditions or materially impair the operation of Metropolitan's water facilities or its ability to complete the proposed project. However, in the interest of full disclosure, the following three cases are noted.

   In February 2001, a case entitled Dewayne Cargill et al. v. Metropolitan Water District of Southern California et al. (Los Angeles Superior Court No. BC 191881) was filed against Metropolitan. This case is a class action lawsuit brought by various categories of temporary workers and certain temporary agencies, claiming that Metropolitan misclassified them to avoid providing them the same rights and benefits given to regular employees. In the first phase of the case, the trial court ruled for the plaintiffs. Metropolitan

appealed the ruling to the California Court of Appeal, which upheld the lower court ruling in favor of the plaintiffs. The California Supreme Court granted Metropolitan's petition for review. Oral argument is expected in late 2002 or early 2003. The outcome of this litigation is uncertain; a result adverse to Metropolitan could have an adverse effect on Metropolitan's financial condition.

In April 2000, the Soboba Band of Mission Indians filed a lawsuit against Metropolitan in Federal district court regarding the affect of a Metropolitan water tunnel on reservation groundwater. The lawsuit seeks an injunction to halt the flow of groundwater, unspecified damages, or restitution in lieu of damages. The outcome of this litigation is uncertain; a result adverse to Metropolitan could have an adverse effect on Metropolitan's financial condition and could potentially obligate Metropolitan to deliver some amount of water to the reservation.

In September 2000, the Third District Court of Appeals issued its decision in Planning and Conservation League v. California Department of Water Resources. This case was an appeal of (i) a challenge under the California Environmental Quality Act (CEQA) of the adequacy of the environmental documentation prepared with respect to certain amendments to the State Water Contract (the "Monterey Amendments") and the selection of the proper CEQA Lead Agency and (ii) the transfer by the Department of Water Resources of the Kern County Water Bank from the State to the Kern County Water District. The appellate court agreed with the trial court that the Department of Water Resources should have been the lead agency and reversed the trial court's holding that the environmental documentation was adequate. The matter is now in confidential mediation proceedings and principles for settlement have been reached. However, if a final settlement is not reached and litigation proceeds, a final decision to invalidate all or a portion of the provisions of the Monterey Agreement could have an adverse impact on the allocation of State Project water to Metropolitan.

A-11 Operations and Maintenance

Operation and maintenance (O&M) costs are provided briefly in Section A-4. The facility would realize a reduction in O&M expenses and thus would not need to identify an additional source of funding for this. The decreased O&M is a savings, not a cost, and so it is not reflected in the Annual O&M costs in Tables 2 and 3. The benefit calculations of Tables 4 a-d are strictly focused on the benefits derived from a water supply point-of-view. Accordingly, the facility's O&M benefits are not included there either.

Application Part B—Engineering and Hydrologic Feasibility

(Application Part B required for construction projects only, including meter installations.)

Not Applicable to proposed project. A new facility is not being constructed.

Application Part C—Plan for Completion of Environmental Documentation and Permitting Requirements

The proposed project is categorically exempt under the provisions of CEQA and the State CEQA Guidelines. The proposed project involves the design, funding, and construction or modification of existing public and private facilities involving negligible or no expansion of use and no possibility of significantly impacting the physical environment. As such, the proposed project qualifies under a Class 1 Categorical Exemption (Section 15301 of the State CEQA Guidelines).

The CEQA determination is: Determine that pursuant to CEQA, the proposed project qualifies under a Categorical Exemption (Class 1, Section 15301 of the State CEQA Guidelines).

Application Part D- Need for Project and Community Involvement

D-1 Need for the Project

Metropolitan Water District is dependant on achieving a significant reduction in demand throughout its service area if it is to meet projected demand into the future. The 1996 Integrated Resources Plan of the District anticipates a reduction in demand of over one million AFY by direct and indirect means by 2020. Programs to realize the savings potential in the residential indoor sector have been relatively successful to date. Much less progress has been made in the Commercial, Industrial and Institutional sectors. Projects like this are expected to help initiate greater implementation of new technologies where they are applicable.

Additionally, manufacturers have cited the rising cost of utilities and their

potential unreliability as reasons to relocate out of California. In order to maintain the State's manufacturing base and improve their ability to compete in the marketplace against firms located where there are significantly less stringent environmental protections, projects like this, including the public assistance aspect, are necessary.

As these newer technologies are adopted, they provide a greater opportunity to supply some of these firms with reclaimed water from the local POTW. If the process train is already on-site, its use to polish the influent reclaimed water will be an easier task. Reclamation projects suffer from a reliance on outdoor irrigation demand. As a result, they don't have enough demand in the winter months and sometimes have to supplement the reclaimed water with potable water to meet summer demands. Getting more industrial users hooked up to the distribution system is important to create a higher baseline demand for reclaimed water year-round.

As pressure mounts on the existing water supplies for Southern California, project like this are more needed that ever. The threat of having Metropolitan's Colorado River supply reduced will directly lead to a greater dependence on the State Water Project. Of course, this means additional stress on the health of the Bay-Delta and the CAL-FED process.

D-2 Outreach, Community Involvement, Support, Opposition

There is no opposition to the project that can be foreseen. Local water agency coordination is in place. The industry representatives are interested in seeing such projects go forward. Much of the interest centers on the reduction in discharge to the sewers. Sanitary sewer agencies have not been contacted but will be part of the project outreach, should the project receive funding.

Application Part E—Water Use Efficiency Improvements and Other Benefits

E-1 Water Use Efficiency Improvements

A reduction in potable demand by 107 AFY at one facility is notable. This represents a 95 percent decrease in water demand while maintaining 100 percent productivity at the facility. The savings is achieved by using the process water multiple times while it remains within the facility.

E-2 Other Project Benefits

This project is consistent with the objectives of the CALFED Bay-Delta Program. Implementation of the proposed conservation project will help Southern California offset growing demands that might otherwise be placed on the State Water

Project system and the Bay-Delta region. Implementing local water use efficiency programs, such as the proposed project, also helps reduce conflict among Bay-Delta water users and stakeholders.

Additional project benefits include reduced sewer loading, reduced volume of material to be disposed of in a landfill, less reliance on hazardous chemicals associated with conventional wastewater treatment such as caustic soda, and greater profitability for the company.

Application Part F – Economic Justification: Benefits to Costs

F-1 Net Water Savings

The wastewater treatment process train as described, is estimated to produce over 95 percent of the influent wastewater as product water suitable for reuse within the facility's processes. With existing demand at the facility of 112 AFY, the product water from the improved treatment system will yield 107 AFY of water that will displace previous potable water demand.

If this water had been discharged into the sanitary sewer, it would likely have been discharged to the Santa Monica Bay. The Orange County Sanitation District is currently determining how to improve the treatment of sewage received by their plants. Numerous contamination events have closed beaches in Orange County and threaten the economics of beachfront communities.

F-2 Project Budget and Budget Justification

The proposed process technology equipment is estimated to cost $550,000. Ancillary costs for project implementation are estimated at $112,000, approximately 20 percent of the equipment expense.

Metropolitan proposes to provide a rebate of $154 to the facility for every acre-foot of reduced demand over the estimated 15 year life of the project. Fifteen years is used because it is expected that over time improvements in membrane technology may make it feasible to revise or replace the proposed process train. With proper maintenance, there is no reason to believe the current system being proposed couldn't endure for much longer than 15 years.

If the estimated savings occurs through the life of the project, it would result in a payment by Metropolitan of $247,170 (107 AFY X 15 Yrs X $154/AF).

The facility itself is being asked to invest ten percent of the cost for project implementation, beyond the in-kind assistance that will necessarily be required.

This is partly to ensure that the facility management and staff have a vested interest in the success of the project and a sense of ownership for its on-going operation. At a total project cost of $662,000, ten percent is an investment of $66, 200 by the facility.

The remaining funding is being requested via this grant application. The amount requested is $348,630.

If the facility were to attempt to implement this project themselves, the primary financial benefit they would receive would be in the form of reduced operating expenses. This amount is estimated as $128,000 per year, as outlined in Section A-4. With a project cost of $662,000, the simple payback period for this investment, from the facility's point-of-view, is 5.2 years ($662,000/$128,000). This payback period is not sufficient to motivate a business to undertake the project without financial assistance.

Because of the significant savings that can be achieved at a single site and the fact this can be replicated throughout the State, this project provides an opportunity to demonstrate the favorable outcome of implementing such technologies. If the water agencies choose to underwrite a portion of this cost to accrue the resultant water savings, a model of business transformation may be possible in a customer segment that has heretofore been difficult to engage.

On a region wide basis, the cost of project investment is more than offset by the benefit from the saved water. Water supplies in Southern California are under significant stress. The value of water, as discussed in F-3, is $700 per acre-foot. As noted in Table 5, the benefit/cost ratio is 1.1 for this project.

F-3 Economic Efficiency

The Alternative Water Cost of Foregone Conservation in the Metropolitan Service Area

Summary

The Metropolitan Water District of Southern California is a wholesaler of water to its 26 member agencies. As part of its ongoing support of locally developed water and conservation, Metropolitan offers incentives of $250 per acre-foot of locally developed recycled, recovered, or desalted water and $154 per acre-foot of conserved water. Although these incentives appear to be unequal, they are equivalent when accounting for Metropolitan's cost of capital and the fact that conservation is typically funded through up-front payments and recycled, recovered, and desalted seawater is typically funded on production.

Metropolitan's $250 per acre-foot incentive is based on avoided cost analyses performed during the development of Southern California's 1996 Integrated Water Resources Plan. However, the total value of conservation funded through Metropolitan's programs transcends Metropolitan's direct avoided costs and incentives. Metropolitan's member agencies are the host of most all of Metropolitan's conservation programs and they also enjoy avoided cost of Metropolitan's water rate or $435 per acre-foot. This rate is often sited by the member agencies as their least cost marginal supply of water.

Adding the rate and incentive together, and accounting for the member agencies higher discount rate, the alternative water cost of foregone conservation in Southern California is approximately $700 per acre-foot. This value also approximates the marginal cost of water recycling in Southern California, which Metropolitan uniformly uses as its alternative regional cost of alternative water supplies. Although this estimate accounts for avoided infrastructure costs at Metropolitan, it does not include the value of avoided infrastructure development for the member agency or retailer and therefore this cost could be higher.

Detail

1. Metropolitan Incentives
    a. Equivalence of MWD Incentives

Year	Acre-feet	Recycling Payment	Conservation Payment	PV($250)	PV($154)
1	1	$ 250.00	$3,080.00	$ 250.00	$3,080.00
2	1	$ 250.00	$ -	$ 235.85	$ -
3	1	$ 250.00	$ -	$ 222.50	$ -
4	1	$ 250.00	$ -	$ 209.90	$ -
5	1	$ 250.00	$ -	$ 198.02	$ -
6	1	$ 250.00	$ -	$ 186.81	$ -
7	1	$ 250.00	$ -	$ 176.24	$ -
8	1	$ 250.00	$ -	$ 166.26	$ -
9	1	$ 250.00	$ -	$ 156.85	$ -
10	1	$ 250.00	$ -	$ 147.97	$ -
11	1	$ 250.00	$ -	$ 139.60	$ -
12	1	$ 250.00	$ -	$ 131.70	$ -
13	1	$ 250.00	$ -	$ 124.24	$ -
14	1	$ 250.00	$ -	$ 117.21	$ -
15	1	$ 250.00	$ -	$ 110.58	$ -
16	1	$ 250.00	$ -	$ 104.32	$ -
17	1	$ 250.00	$ -	$ 98.41	$ -
18	1	$ 250.00	$ -	$ 92.84	$ -
19	1	$ 250.00	$ -	$ 87.59	$ -
20	1	$ 250.00	$ -	$ 82.63	$ -
Total	20	$5,000.00	$3,080.00	$3,039.53	$3,080.00

Preceding is a 20-year example of payment steams for projects, such as conservation, that receive funding at $154 per acre-foot up-front compared to projects, such as recycling, that receive up to $250 per acre-foot on production. Column 1 shows the years of the compared projects 1 through 20. Column 2 shows that both projects are produce 1 acre-foot per year. If the project is water recycling, it can receive up to $250 per acre-foot produced in the year of production. Column 3 shows this payment. Alternatively, if the project is for conservation, it may receive $154 per acre-foot of projected production over an agreed life of the program. In this case, column 4 shows the up-front payment of $3,080 ($154 per acre-foot * 1 acre-foot per year * 20 Years) in year one of the program. Columns 5 and 6 show the comparable present value of payments, discounted at 6% (the typical long-term discount rate used by Metropolitan since 1996), under the two programs. This simple example yields results within 1.5%

of each other. Under certain conditions the $154 per acre-foot yields more on a present value basis and sometimes this result is reversed, however this example is not atypical.

b. Added Value to Member Agencies with Higher Discount Rates

Typically, the discount rate for Metropolitan's member agencies is higher than Metropolitan's own discount rate. As a result, the member agencies see greater value in up-front payments for programs. If, instead of a 6% discount rate, the analysis used a higher discount rate of 7%, then the value of the up-front payment to member agencies climbs to a value of over $270 per acre-foot. This is a closer approximation of the value derived by member agencies from the Metropolitan conservation incentive program.

2. Metropolitan's Rate Structure and Member Agency Avoided Cost

Metropolitan charges unbundled rates for it water services, however adding its component part will derive an avoided aggregate rate. This aggregate rate in currently $435 per acre-foot for delivered treated water and is forecasted to keep pace with the consumer price index over the next ten years. Member agencies regularly use this price signal as their alternative cost of water. They also often use the cost of recycled water at approximately $700 per acre-foot and member agencies may soon use upwards of that number, as they seriously consider the introduction of seawater desalination into Southern California's water resource plans.

3. Total Avoided Cost

Using the member agency value of recycling ($700 per acre-foot) or the aggregate of Metropolitan's conservation incentives ($250-$270 per acre-foot) and avoided water rate (currently $435 per acre-foot), it is clear that the value of conservation in the Southern California region approximates $700 per acre-foot. This estimate does not account for potential member agency infrastructure savings or the forecasted increases in Metropolitan water rates, which if estimated could make these estimates higher.

Analysis assumptions

- **Period of analysis.** The analysis period is 15 years.
- **Inflation and escalation. Z**ero future inflation and escalation of costs is used.
- **Discount rate.** A 6 percent discount rate is used.
- **Dollar value base year.** All costs and benefits are expressed in 2002 dollars.

Avoided Cost of Current Supply Source (Table 4a). $700 per acre-foot.

Appendix- Benefit/Cost Analysis Tables

Table 1: Capital Costs

	Capital Cost Category *(a)*	Cost *(b)*	Conty Percent *(c)*	Contingency $ *(d)*	Subtotal *(e)*
				(bxc)	*(b+d)*
(a)	Land Purchase/Easement				
(b)	Planning/Design/Engineering	$30,000			
(c)	Materials/Installation	$64,000			
(d)	Structures				
(e)	Equipment Purchases/Rentals	$550,000			
(f)	Environmental Mitigation/Enhancement				
(g)	Construction/Administration/Overhead	$18,000			
(h)	Project Legal/License Fees				
(i)	Other				
(j)	Total **(1)** (a + ... + i)	$662,000			
(k)	Capital Recovery Factor: use Table 6 Life = 15 Years	0.1030			
(l)	Annual Capital Costs (j x k)	$68,186			

(1) Costs must match Project Budget prepared in Section F-2.

Table 2: Annual Operations and Maintenance Costs

Administration *(a)*	Operations *(b)*	Maintenance *(c)*	Other *(d)*	Total *(e)*
-	-	-	-	$0

Table 3: Total Annual Costs

Annual Capital Costs (1) *(a)*	Annual O&M Costs (2) *(b)*	Total Annual Costs *(c)* *(a+b)*
$68,186	$0	$68,186

(1) From Table 1 line (l)
(2) From Table 2 Total, column *(e)*

Table 4: Water Supply Benefits

Net water savings (acre-feet/year) 107

4a. Avoided Costs of Current Supply Sources

Sources of Supply *(a)*	Cost of Water ($/AF) *(b)*	Annual Displaced Supply (AF) *(c)*	Annual Avoided Costs ($) *(d)* *(b x c)*
	$700	107	$74,900
Total	$700	107	$74,900

4b. Alternative Costs of Future Supply Sources

Future Supply Sources *(a)*	Total Capital Costs ($) *(b)*	Capital Recovery Factor (1) *(c)*	Annual Capital Costs ($) *(d)* *(b x c)*	Annual O&M Costs ($) *(e)*	Total Annual Avoided Costs ($) *(f)* *(d + e)*
					0
					0
					0
					0
					0
					0
Total					0

(1) 6% discount rate; Use Table 6- Capital Recovery Factor

4c. Water Supplier Revenue (Vendibility)

Parties Purchasing Project Supplies *(a)*	Amount of Water to be Sold *(b)*	Selling Price ($/AF) *(c)*	Expected Frequency of Sales (%) (1) *(d)*	Expected Selling Price ($/AF) *(e) (c x d)*	"Option" Fee ($/AF) (2) *(f)*	Total Selling Price ($/AF) *(g) (e + f)*	Annual Expected Water Sale Revenue ($) *(h) (b x g)*
						0	
						0	
						0	
						0	
						0	
						0	
						0	
Total						0	

(1) During the analysis period, what percentage of years are water sales expected to occur? For example, if water will only be sold half of the years, enter 50% (0.5).

(2) "Option" fees are paid by a contracting agency to a selling agency to maintain the right of the contracting agency to buy water whenever needed. Although the water may not be purchased every year, the fee is usually paid every year.

4d: Total Water Supply Benefits

(a) Annual Avoided Cost of Current Supply Sources ($) from 4a, column (*d*)	$74,900
(b) Annual Avoided Cost of Alternative Future Supply Sources ($) from 4b, column (*f*)	
(c) Annual Expected Water Sale Revenue ($) from 4c, column (*h*)	
(d) Total Net Annual Water Supply Benefits ($) (a + b + c)	$74,900

Table 5: Benefit/Cost Ratio

Project Benefits ($) (1)	**$74,900**
Project Costs ($) (2)	**$68,186**
Benefit/Cost Ratio	**1.1**

(1) From Tables 4d, row (d): Total Annual Water Supply Benefits
(2) From Table 3, column (*c)* : Total Annual Costs

Table 6: Capital Recovery Factor

(Use to obtain factor for Table 1, Line k or Table 4b, Column *(c)*

Life of Project (in years)	Capital Recovery Factor
7	0.1791
8	0.1610
9	0.1470
10	0.1359
11	0.1268
12	0.1193
13	0.1130
14	0.1076
15	0.1030
16	0.0990
17	0.0954
18	0.0924
19	0.0896
20	0.0872
21	0.0850
22	0.0830
23	0.0813
24	0.0797
25	0.0782
26	0.0769
27	0.0757
28	0.0746
29	0.0736
30	0.0726
31	0.0718
32	0.0710
33	0.0703
34	0.0696
35	0.0690
36	0.0684
37	0.0679
38	0.0674
39	0.0669
40	0.0665
41	0.0661
42	0.0657
43	0.0653
44	0.0650
45	0.0647
46	0.0644
47	0.0641
48	0.0639
49	0.0637
50	0.0634

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SUMMARY

- Nationally recognized expert in the field of water conservation
- Excellent public speaking skills
- Effective manager and team leader
- Registered Professional Civil Engineer in California

PROFESSIONAL EXPERIENCE

METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA, Los Angeles, CA

1993 - Present **Engineer**
- Implementing Conservation programs for a service area of 17 million people
- Managed large Commercial/Industrial on-site water-use survey program
- Responsible for comprehensive conservation program strategy

JAMES M. MONTGOMERY, CONSULTING ENGINEERS, INC., Pasadena, CA

1991-1992 **Supervising Engineer**
- Analyzed long-term water supply options for a coastal community
- Maintained public involvement through Citizen Forums

U.S. ARMY CORPS OF ENGINEERS, Los Angeles District, Los Angeles, CA

1987-1991 **Study Manager**
- Managed a comprehensive water control study for Los Angeles County
- Administered a $1 million annual budget
- Oversaw a $327 million flood control project design for the LA River
- Authored feasibility report and coordinated Environmental Impact Study
- Served as District point of contact on all Los Angeles River issues

1984-1987 **Reservoir Regulation Unit Chief**
- Coordinated water control activities in the Los Angeles District
- Developed an expert system algorithm for dam operations
- Authored reservoir Water Control Manual
- Supervised a seven person staff

PROFESSIONAL ASSOCIATIONS

Member, American Water Works Association, Conservation Division
Ex-Chair of ICI Water Conservation Committee, American Water Works Association
Ex-Chair of CII Subcommittee, California Urban Water Conservation Council
Instructor, Water Conservation Training Workshops offered by CUWCC

EDUCATION

1997-2000	University of California Extension, Los Angeles, CA Near completion of a Certificate in Personal Financial Planning
1985-Present	Employer sponsored courses in Project Management, Planning Policy, Financial Analysis, Hydrologic Modeling, and others
1982-1984	University of Colorado, Boulder, CO **Master of Science, Civil Engineering** Concentration in Water Resources engineering
1976-1979	University of Maryland, College Park, MD **Bachelor of Science, Physical Sciences**

PUBLICATIONS

1985 "A Simulation Model of Boulder's Alpine Water Supply," with C.M. Brendecke, Proceedings of the 53rd Western Snow Conference, Boulder, CO

1984 "Application of the Precipitation-Runoff Modeling System to the Boulder Alpine Watershed," Master's Thesis, Boulder, CO

PRESENTATIONS

2002 “Encouraging Innovative Approaches to Water Conservation,” American Water Works Association 2002 Annual Conference, New Orleans, LA

1998 "Response to a Water Efficiency Survey Program for the CII Sector: Why Customers Do or Don't Implement Survey Recommendations," American Water Works Association 1998 Annual Conference, Dallas, TX

1997 "Identifying the Conservation Opportunities in the CII Sector," American Water Works Association, 1997 Annual Conference, Atlanta, GA

1991 "Political and Institutional Constraints on Water Resource Studies," ASCE 18th Annual Water Resources Planning & Management and Urban Water Resources Conference, New Orleans, LA

1984 "Management of a Municipally Owned Alpine Watershed Using Continuous Simulation," International Symposium on Urban Hydrology, Hydraulics and Sediment Control, University of Kentucky, Lexington, KY

AWARDS

Official Commendation for Outstanding Work - July 1989 and February 1990
Special Award for Extraordinary Performance - April 1988, May 1989, December 1989